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a conclusion which agrees well with what was previously known concerning the development of the red corpuscles.

Gustav Fornier points out (*Biol. Centralblatt*, Bd. XIX, p. 549) that the lizard, *Lygodactylus picturatus*, and several other species of the genus are provided with a sucking disk at the end of the tail, similar in structure to those on the toes.

BOTANY.

Colors of Flowers. — The author of this contribution¹ to the discussion of the origin and significance of color in flowers has evidently set out with a clearly defined purpose. In his preface he declares that he was not entirely satisfied with the soundness of the theories of Grant Allen and of Hermann Müller, whom he brackets together as authorities. Moved by this discontent, he investigated the coloration of many flowers (and of some other things), and this little work embodies his results.

Briefly stated, Mr. Hervey's conclusions are to the effect that Grant Allen's hypothesis in regard to the sequence of colors, namely, that yellow is the primitive color, and that white, red or purple, violet or blue are more highly evolved colors, is an untenable one. Müller's statements in regard to the preferences of certain insects for especial colors are taken up in some detail and considerable evidence is adduced in the attempt to show that insects are somewhat indifferent to color, and that many of them, honey bees for example, find very inconspicuous and partially concealed nectariferous flowers by "instinct." Bumblebees, by some inscrutable neglect of evolution or Providence, have unfortunately been left out in the distribution of this instinct and have to get along without it, making up, however, to some extent for the lack of it by the brutality with which they bite through corolla tubes and help themselves to nectar.

The author offers "as an original solution of the subject [of the origin of honey-guides]" the statement: "This richness of color [in *Tropæolum*] is occasioned by the irritating influences of the bees in traversing the same route to and from the nectary, thus stimulating the flower to send more of its peculiar pigment to this point, same

¹ Hervey, E. Williams. *Observations on the Colors of Flowers*. New Bedford, 1899. 8vo, 104 pp.

as a little friction or a pinch will bring the blood to the cheek and cause a rosy tint." Even the lay reader will find little difficulty in judging of the value of the analogy between the development of pigment in cells of petals and the response of human arteries to stimulation transmitted from the central nervous system.

It is hardly worth while to multiply instances of inaccurate and fanciful reasoning like the case just cited. Evidently Mr. Hervey is not versed in modern systematic botany or he would not say, "The Ranunculaceæ are placed first in order in our floras, we imagine for the reason that the flowers of this family are very simple in construction." If he is acquainted with the histology of the sepals and petals which he is discussing as regards their coloration, the fact does not appear in his pages. In short, he is not sufficiently equipped successfully to attack the very difficult problem of the nature and genesis of the colors of floral organs. If his labors should prove to be of use to the scientific investigator, it will be by his having collected and tabulated a considerable number of facts in regard to the distribution of color in flowers and the sequence of tints where there are progressive changes of coloration.

JOSEPH Y. BERGEN.

The Teaching Botanist.¹—To those who have kept in touch with the changing conditions of secondary education during the last decade, it has become most apparent that there has been a steadily growing demand that greater consideration should be given to the natural sciences. Very possibly the numerous summer schools maintained by the various colleges have served to cultivate and strengthen this tendency, if they were not directly responsible for it in the first instance; and the large number of teachers who annually take the time set apart for a much-needed rest to qualify themselves further in some special subject affords ample evidence, not only of the gathering force of the demand, but also of the seriousness of purpose which underlies it. In no subject has this movement gained greater headway than botany, and if evidence of this fact were needed, it might be found in the numerous text-books and laboratory guides which have appeared within recent years, all directed toward supplying working force to the teacher who is not a specialist, and who is usually compelled to divide his or her time among several subjects.

It has long been felt that some unification of method would be in

¹ *The Teaching Botanist*, a manual of information upon botanical instruction, together with outlines and directions for a comprehensive elementary course, by W. F. Ganong, Ph.D. New York, The Macmillan Company, 1899. 270 pp.